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Running Head: Gender, Ethnicity, Age, Education and Rorschach Scores

The Association of Gender, Ethnicity, Age, and Education with Rorschach Scores

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Abstract

We examined the association of gender, ethnicity, age, and education with 60 Rorschach scores using three clinical and nonclinical samples of adults and youths ($n_s = 640, 249, \text{ and } 241$). As anticipated for our datasets, there were no reliable associations for gender, ethnicity, or adult age. However, in adults years of education was associated with variables indicative of complexity, determinant articulation, cognitive synthesis, and coping resources. In the clinical sample of youths, increasing age was primarily associated with more conventional perception and less illogical thought processes. Limitations are discussed in conjunction with further research that could address them, along with implications for applied practice.

Keywords: Rorschach, Demographic Associations, Gender, Ethnicity, Age, Education

The Association of Gender, Ethnicity, Age, and Education with Rorschach Scores

The extent to which demographic variables, such as gender, ethnicity, age, or education are associated with psychological test scores is important because inferences about what is typical or expected may have to be contextualized based on these factors. Younger and older men or women, as well as people from different cultural or educational backgrounds, may differ in the way they understand the verbal items on a test or perceive the stimuli or demands of a performance task, and their responses may consequently reflect these differences. In some cases, background characteristics may affect the test scores in ways that indicate test bias is present, which is defined as systematic measurement error differentially affecting certain groups of individuals (Anastasi & Urbina, 1997; Jensen, 1980; Nunnally & Bernstein, 1994). In such cases, there is a deviation between observed scores on the test and actual characteristics, which then will lead to faulty inferences with negative implications for the quality of the assessment process.

Despite initial controversies that originated after the publication of the first intelligence tests (Binet & Simon, 1916/1973; Stern, 1914), research has shown that the major ability and personality tests are relatively fair and unbiased with respect to gender and ethnic influences (Reynolds, Lowe, & Saenz, 1999). Importantly, even when differences exist across demographic variables, they do not indicate test bias on their own but instead may reflect genuine individual differences that test scores are validly documenting (e.g., a ruler is not biased just because it shows that men, on average, are taller than women; Nunnally & Bernstein, 1994; Reynolds, 2000a, 2000b; Timbrook & Graham, 1994). Nonetheless, to ensure unbiased assessment clinicians need to be attentive to their clients' background and mindful of any potential relationships between demographic variables and test scores.

Considerable research has investigated the influence of gender, ethnicity, age, and

education on cognitive functioning. The most recent reviews indicate that gender differences are generally very small and limited to a few specific abilities. Men perform slightly better in visuospatial abilities (e.g., mental rotation) and women show some advantage in verbal and memory abilities (e.g., Johnson & Bouchard, 2007). The mean level of *g*, however, is virtually identical across genders (Jensen, 1998; Nisbett et al., 2012). The association of ethnicity with cognitive functioning is instead much stronger. Despite some criticisms (e.g., Nell, 2000) and considerable debate about the causes and implications of the findings (see Nisbett et al., 2012, for a review), data indicate that there are ethnic differences in cognitive ability test scores (Lynn & Vanhanen, 2002; Neisser et al., 1996; Rushton, 2000; Rushton & Jensen, 2005). With respect to age, it is well known that as children age they perform better on cognitive tasks and for that reason cognitive assessment instruments offer different norms for children at different ages (e.g., Wechsler, 2003). A large body of literature also indicates that in adulthood, with advancing age some decline occurs in terms of speed of information processing, working memory, and perceptual organization, while verbal or crystallized abilities usually show minimal or no change (Bowden, Weiss, Holdnack, & Lloyd, 2006; Ryan, Sattler, & Lopez, 2000; Salthouse, 2012; Taub, McGrew, & Witta, 2004). Perhaps not surprisingly, cognitive functioning is also strongly associated with education (for a systematic review, see Walker, Batchelor, & Shores, 2009).

The role of gender, ethnicity, age, and education also has been examined in relation to commonly used self-report personality inventories such as the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1940) and its revision, the MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989). Schinka, LaLone, and Greene (1998) investigated the association of demographic variables and psychopathology with raw scores of MMPI-2 scales among adults. Very few scales were substantially associated with the

demographic variables, which they defined as a correlation-equivalent of $r = .32$ (i.e., 10% of scale variance) after controlling for psychopathology. Gender was the only exception, with a substantial influence on the intentionally gendered test scales ($r_s > .51$ for Masculinity-Femininity, Gender Masculinity, and Gender Femininity) and a smaller association with phobic like fears ($r = .34$). Associations with ethnicity, age, and education were almost always trivial, with the largest being $r = .20$ between age and the Social Responsibility scale.

Using the full MMPI-2 normative data, a very large clinical sample, and an expanded set of scales, Greene (2011) reported gender associations that were consistent with Schinka et al. (1998), as well as a lack of ethnicity associations that was consistent both with Schinka et al. and the only meta-analysis on this topic (Hall, Bansal, & Lopez, 1999; also see Butcher et al., 2000). However, Greene highlighted a handful of changes across decade-based age groups for people in their 20s through their 80s. Differences of 5 and 10 T-score points (i.e., $\frac{1}{2}$ to 1 SD) included declines in externalizing problems and hypomania and increases in somatic concerns and self-reported virtues. When considering education in 2-year increments from 6-8 years through 19+ years, Greene observed more notable differences, including steady declines in infrequently reported symptoms and increases in reported virtues in both the normative and clinical sample. There was a parallel decline in most scale scores for the clinical sample. In the normative sample the education changes were less pervasive, having almost no association with the ten Clinical Scales. However, on Content and Supplemental Scales there was a general trend for people with increasing education to report less psychopathology, including depression, health concerns, cynicism, hostility, bizarre mentation, work complications, and family problems, and more positive attributes, including ego strength, dominance, and social responsibility, with differences of 7 to 15 T-score points across the least to most educated groups.

Morey (2007) examined demographic associations in adults on the Personality Assessment Inventory (PAI). Gender had trivial associations with the primary PAI scales, except for men scoring 5 to 10 T-score points higher on antisocial qualities and alcohol problems. Ethnicity also had trivial associations, though paranoia and suspiciousness were elevated 5 to 10 T-score points in non-Caucasian groups. For age, college students and young adults reported fewer somatic concerns and higher energy levels, sensation seeking, and borderline and antisocial characteristics relative to adults in general, though Morey considered the 5 to 10 T-score point differences modest and recommended against separate college student norms. Education was considered in four categories (4 to 11, 12, 13-15, and 16+ years) and its associations were generally consistent with those reported by Greene for the MMPI-2 Content and Supplemental Scales. There was a general trend for increasing education to be associated with self-reports of less psychopathology, including health concerns, anxiety, depression, paranoia, borderline features, and drug problems, as well as an increase in dominance, with differences in the range of 7 to 10 T-score points.

Within adolescents aged 14 to 18 Schinka, Elkins, and Archer (1998) examined the association of demographic variables and psychopathology with scales from the adolescent MMPI (MMPI-A; Butcher et al., 1992). Gender, ethnicity, and age had no clinically meaningful associations with scales after controlling for psychopathology. However, considerable research documents how adolescents produce notably different MMPI protocols than adults (e.g., Archer, 1987; Greene, 2011; Herkov, Gordon, Gynther, & Greer, 1994), which led to the development of the MMPI-A. Greene (2011) noted that these differences extend through young adulthood, at least up to age 19 and possibly age 21, and encompass higher reports of general psychopathology in adolescents, particularly externalizing characteristics.

Empirical data using other measures of personality also indicate that there are some gender differences in certain personality dimensions (e.g., Costa, Terracciano, & McCrae, 2001; Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006; Feingold, 1994)¹. Women generally score higher on scales of internalizing problems or neuroticism, warmth, and agreeableness, while men score higher on self-oriented (i.e., agentic) or externalizing characteristics. It is also worth noting that the association of gender with psychological test scores may change over time, as cultural norms evolve. Thus, one might see different gender effects in substantially different age cohorts, though this issue has not been addressed in the literature reviewed above.

The extent to which gender, ethnicity, age, and education are associated with scores derived from the Rorschach task (Rorschach, 1921) has been investigated in the past, though without definitive conclusions. Below we review the relevant research for each variable in turn.

Rorschach Scores and Gender

The study of gender differences on the Rorschach has received relatively little focused attention in the literature. When we searched PsycINFO for title cue words consisting of ‘Rorschach’ and ‘gender’ only 16 results appeared: 8 were unpublished dissertations and only one was an academic journal article published since 2000 (Resende, Viglione, & Argimon, 2009), though this article did not address the association of gender with Rorschach scores, but rather investigated gender differences in schizophrenia by using the Rorschach.

The first studies on Rorschach gender differences focused on examiner/respondent interactions and on the effects of these interactions on the sexual content of responses. Milner

¹ Among custody litigants, women have been found to have elevated base rate scores for the Histrionic, Narcissistic, and Compulsive scales of the Millon Clinical Multiaxial Inventory (Lampel, 1999; McCann et al. 2001). However, this has not replicated in an inmate sample of patients and nonpatients (Rossi, van der Ark, & Sloore, 2007) and may be due to the way base rate scores are differentially computed by gender rather than reflecting differences in the raw scores actually endorsed (Hynan, 2004).

and Moses (1974), for example, reported that when both examiner and respondent are male, the number of sexual content responses was significantly higher than with any other gender combination. Ephraim, Occupati, Riquelme, and Gonzalez (1993) reported a number of significant content differences by gender when they investigated normative Rorschach data from 216 Venezuelan records. However, it was not clear how many statistical analyses were examined in the study and thus whether some of the findings might have been due to chance.

Most of the available literature suggests minimal or no Rorschach differences between men and women. Yanovski, Menduke, and Albertson (1995) studied gender influences on the Rorschach task by using the Visual Imagery Reactivity scoring system (Yanovski & Fogel, 1978) and concluded that scores were not associated with gender. In a dissertation study, Coursol (1996) examined 31 males and 31 females and found women were higher in both color and human movement, though this may have been secondary to women producing more responses to the task overall. In another dissertation study, Holmquist (2012) investigated the Comprehensive System (CS; Exner, 2003) scores of juvenile offenders and failed to find hypothesized gender differences. Similarly, a dissertation by Campbell (2005) found no substantive gender differences in adolescents receiving residential treatment for disruptive behavior disorders, though there was some evidence that females may show more change in response to treatment than males. Exner (1991) conducted the most comprehensive analysis of gender differences in CS scores by presenting normative data separately for males and females. He concluded that all differences were “inconsequential” (p. 38) and subsequently has only presented normative reference data across combined gender groups. The same decision was made for the recently introduced Rorschach Performance Assessment System (R-PAS; Meyer, Viglione, Mihura, Erard, & Erdberg, 2011), which also does not present different normative data for men and

women.

Based on the available research, men and women overall seem to produce similar Rorschach records. As such, we did not expect to see gender differences in our study.

Rorschach Scores and Ethnicity

The extent to which ethnicity² is associated with Rorschach scores has been controversial. In 1986 Exner compared data from White and non-White Americans and concluded that the latter tended to produce more color responses; no other notable differences were reported (Exner, 1986). In 1992 Frank reviewed the available literature and concluded that the only consistent finding across studies was that Black Americans tend to give fewer responses than White Americans (Frank, 1992). In 1999 Wood and Lilienfeld took a very different and extreme position, warning that the CS may be inappropriate for use with minorities due to potential cultural bias (Wood & Lilienfeld, 1999). They asserted not only that “Blacks, Hispanics, Native Americans, and non-Americans score differently on important Rorschach variables” (p. 342) but that the absence of ethnicity-specific norms created test bias against these groups. However, only one of the CS findings they cited compared two ethnicity-based samples that were collected concurrently by the researchers to study ethnic differences (Glass, Bieber, & Tkachuk, 1996). Glass et al. found no evidence for expected acculturation effects and only 3 of 16 other hypothesized ethnic differences were observed. The other five CS studies cited by Wood and Lilienfeld as evidence for ethnic bias only compared a targeted minority group to

² Ethnicity is a broad term that encompasses racial and cultural heritage as well as current cultural identifications. In the U.S. most research on ethnicity has contrasted Americans with ancestry in Europe, Africa, Asia, or North America, with an additional specification for Hispanic or Latino ethnicity regardless of racial background. These classifications are more complicated when addressing cultural and ethnic identifications in other countries, as terms like Asian American, African American, or Native American do not apply. In addition, what constitutes an ethnic majority versus minority can shift from one country to another. Consequently, for this article, unless more specific ethnic or cultural identifications have been studied, our terminology relies on the racial categories used by the U.S. census bureau of White, Black, Asian, or Native American, though we also add Hispanic to reflect that cultural identification, as well as Mixed or Other.

Exner's CS norms, finding notable differences for some variables. Subsequent research on Rorschach normative samples has revealed that the CS norms used at that time were the problem rather than cultural differences, as even nonpatients from majority culture deviated in similar ways from the CS norms (Meyer et al, 2011; Meyer, Shaffer, Erdberg, & Horn, 2014; Meyer, Viglione & Giromini, 2014a; Viglione & Hilsenroth, 2001; Viglione & Meyer, 2008).

To further investigate Wood and Lilienfeld's (1999) claim of important differences and possible ethnic bias against minority groups, Meyer (2002) compared data from 432 patients across different U.S. ethnic groups. He examined the association of 188 CS scores with ethnicity (defined as White vs. Black or White vs. non-White), conducted 17 convergent validity analyses to evaluate slope and intercept test bias, and compared the component structure of Rorschach scores in minority and majority groups. In contrast to Wood and Lilienfeld, he concluded there was in fact no evidence of ethnic bias in the Rorschach and also no differences after controlling for other demographic variables. This position is also supported by a number of other studies, including both journal articles and unpublished dissertations. For instance, Chen, Gong, Li, Jie (1997) investigated data from Chinese and American individuals; Le (2002) from Vietnamese and American Vietnamese individuals; Daroglou (2004) from Greek and White American individuals; Gowri (2000) from Asian Indian Americans and White American individuals; and Rafiee (2014) from Iranian-Americans to CS norms and R-PAS norms. Overall, although expected cultural or ethnic differences are discernable in the verbal descriptions of response imagery (Gowri, 2000; Rafiee, 2014), these studies produced either very modest differences or inconsistent results in CS summary scores. Along the same line, Presley, Smith, Hilsenroth, and Exner (2001) investigated Black and White Americans. Their main conclusion was that there was a striking similarity between the two groups, although some small differences did emerge.

However, those small differences did not replicate in Meyer's (2002) analyses.

In a study of country-based ethnic differences in Rorschach scores Meyer, Erdberg, and Shaffer (2007) compiled CS data from 21 adult samples drawn from 17 countries ($N = 4,704$). They examined 136 scores across samples and found that scores were generally quite similar across cultures and countries. In fact, almost all scores in all samples (2,845 of 2,856 scores, or 99.6%) fell within one standard deviation of the composite mean value, and most of them (2,726 of 2,856 or 95.4%) were in an even narrower range of one half a standard deviation around the mean. Thus, the available literature, although incomplete and not comprehensively studying ethnicity in all its various racial, cultural, and international forms suggests that ethnicity should only have a minimal association with Rorschach scores.

Rorschach Scores and Age

The research on the association of age with Rorschach scores has mostly focused on two main domains: the impact of psychological maturation in children and adolescents and evidence of a cognitive decline at older ages. The data indicate that children produce different Rorschach records as they mature. Although the current evidence in adulthood is not conclusive, the responses of younger and older adults do not seem to differ notably.

After comprehensively reviewing the relevant literature, Stanfill, Viglione, and Resende (2013) introduced the Developmental Index (DI) as a composite Rorschach measure that strongly correlates with age in children and adolescents ($r = .40$ in the cross-validation clinical group) and strongly discriminates between children and adults ($d = 1.15$ in an independent cross-validation sample). Although many variables are associated with age (e.g., Popular responses, Human Movement, Sum of Shading, Determinant Blends), the DI is formed by individual variables that account for unique variance over and above general protocol complexity. It includes

determinants associated with the level of sophistication of the record (Percentage of Pure Form responses [F%], Inanimate Movement [m], Form-Dimension [FD], Reflection [r], Texture [T], and Vista [V]), perceptual accuracy variables (i.e., Distorted [FQ-%] and Conventional [FQo%] Form Quality), and certain contents that involve adult concerns and knowledge (Anatomy [An], Art [Art], and Sex [Sx]). That is, as the children grow up, they tend to produce more complex and sophisticated records, show improved perceptual processing, and articulate more varied and mature contents. These findings are consistent with previous research (e.g., Ames, Metraux, Rodell, & Walker, 1974; Ames, Metraux, & Walker, 1971; Exner, 2003; Exner, Thomas, & Mason, 1985; Exner & Weiner, 1994; Weiner, 2003), though the CS norms were atypical in that they did not show a developmental advance in perceptual accuracy.

It is less clear whether Rorschach scores differ between younger and older adults. Although they did not study changes in adulthood in depth, Stanfill et al. reported that the DI increased up to approximately age 25 but not thereafter. In his monograph, Hermann Rorschach (1921) anticipated that a number of variables would show age associations even above the age of 40 (p. 66). Early support for this position came from Klopfer (1946), who studied 50 elderly people with a median age of 74, 30 of whom lived in a home for the elderly and 20 from a similar economic background who did not. The two sub-groups did not differ, but all individuals were slower to respond than general adult norms and showed more constricted thought and less productivity, shading, color, popular, and human movement responses. Other research data also supported Rorschach's hypothesis that younger and older adults might produce different records (e.g., Caldwell, 1954; Davidson & Kruglov, 1952; Prados & Fried, 1947). Later contributions, however, criticized these early findings, and pointed out that they in fact suffered from a number of methodological limitations (Lezak, 1987; Mattlar, Knuts, & Virtanen, 1985; Reichlin, 1984).

Consistent with these criticisms, later studies failed to find the postulated relationship between aging and the Rorschach, or produced mixed results.

Gross, Newton and Brooks (1990), for example, investigated 47 healthy community-dwelling elderly individuals, with one subgroup between the ages of 65 and 70 and the other subgroup between the ages of 74 and 87. They examined 16 CS variables that aligned with Rorschach's expectations for cognitive decline but did not find a significant multivariate association for age across the two groups and concluded that "age and intellectual level may contribute less to Rorschach responses than was previously thought" (p. 335). Similarly, Pertchik, Shaffer, Erdberg, and Margolin (2007) studied a group of 52 community residing older adult nonpatients ranging in age from 60 to 80 years using the CS. With two exceptions, their data were unremarkable relative to comparable norms for general adults (e.g., Meyer et al., 2007). The exceptions were an elevated number of Level 1 Deviant Verbalizations (DV1) and Personal Knowledge Justification (PER) scores, neither of which were the kind of variables Rorschach had in mind when describing changes that may emerge with adult aging.

However, Shimonaka and Nakazat (1991) conducted a large scale 10-year longitudinal study on aging, starting with a sample of 236 healthy nursing home residents in Tokyo who had an average age of 76.4. Fifty two of these individuals were assessed six times every two years until the end of the study using the Klopfer system. They observed a medium to large decline in response productivity and small to medium sized changes on four other variables, with an increase in card rejections and decreases in shading, popular responses, and range of content. Expected increases in distorted responses were not found. Similar changes were observed when test data obtained in the period before participants died were compared to comparable data for survivors, regardless of age.

A much earlier study by Ames, Metraux, Rodell, and Walker (1973) had both a cross-sectional and longitudinal component. For the cross-sectional component, Ames et al. studied 200 individuals; 101 were 70 to 79 years old, 86 were 80 to 89 years old, and 13 were 90 to 100 years old. The sample was predominantly female and institutionalized. They believed their elderly sample “differed in no appreciable way” (p. 23) from normal adults and they also did not find consistent differences across their age bands, which surprised them. However, they did find differences between those living independently and those who were institutionalized after matching on age, sex, and socioeconomic status (SES). Those who were institutionalized had lower perceptual accuracy, popular, movement, and color, with a higher proportional of pure form and anatomy percepts. Their longitudinal study examined a cohort of 61 individuals over a four to five year interval who were in various living conditions at baseline (independent, retirement home, nursing home). Like Shimonaka and Nakazat (1991), Ames et al., did not screen out individuals with cognitive decline and did not select healthy or independently functioning individuals. Over time, they observed a decline in response productivity, color, and good form quality and an increase in the proportions of whole responses, pure form responses, and animal content. Both of these longitudinal studies largely support Rorschach’s original postulates about changes due to age.

Some of the disparate findings on the association of aging and Rorschach responding is likely a function of methodological decisions by study authors to include or exclude individuals with cognitive impairment due to natural aging processes, including stroke and dementia. Given that age related declines in cognitive functioning are often associated with dementia and that dementia is clearly associated with Rorschach variables measuring engagement and cognitive processing, such as number of responses, extent of form determined responding, human

movement, determinant blends, and synthesized responses, as well as variables measuring perception and thinking problems, such as distorted form quality and popular responses (Meyer et al., 2011; Mihura et al., 2013), one could anticipate aging effects to be present with relevant Rorschach scores to the extent that individuals with cognitive decline are included in the sample under study.

Overall then, there are clear developmental influences on Rorschach scores related to complexity of engagement, determinant articulation, perceptual accuracy, and certain types of content for children and adolescents and these trends may extend into young adulthood (Stanfill et al., 2013). For adults who are living independently and not cognitively compromised, there do not appear to be age-related associations with the same variables. However, as age-related cognitive decline emerges, particularly with respect to dementing illnesses, one would expect to see a negative association of age with the same set of variables. Consistent with these ideas, Exner (2003) provided separate data for children at different chronological age levels, but collapsed all adult data from ages 19 to 70 into one single table. R-PAS similarly provides a single set of norms for all normally functioning adult ages (Meyer et al., 2011) but separate age-based norms for children (Meyer, Viglione, & Giromini, 2014b).

Rorschach Scores and Education

The extent to which education is associated with Rorschach scores also would benefit from additional research. The few empirical studies suggest that more educated and less educated adults approach the Rorschach very differently. After investigating about 300 adult Portuguese CS records, Pires stated: “Results indicate that, in Portugal (Pires, 2000), level of education is the variable that seems to have the largest effect on Rorschach responding” (Pires, 2007, p. S124). The adults in this sample had considerable variability in years of education, with the lowest

group having an average of 5.5 years, the middle group an average of 10.5 years, and the highest group having an average of 15.8 years. Increasing education was associated with notable increases in determinant articulation, cognitive synthesis, and variables generally indicative of coping resources. Along the same lines, Nascimento (2004) investigated the relationship between selected CS Rorschach scores, education, and socioeconomic status among 200 Brazilian adults classified into four groups that had on average 5.1, 10.9, 13.3, or 15.9 years of education. She found that higher education was associated with more articulation of determinants, greater synthesis of response components, higher coping resources, and to a lesser extent increased responses. Ames et al. (1973) examined the association of an SES variable largely defined by years of education with various scores. They similarly found that higher education was associated with greater productivity, whole responses, color, human movement, and shading, and less responding determined just by form. In the R-PAS manual, Meyer et al. (2011) anticipated that Complexity and its subcomponents measuring differentiation, integration and productivity also should be associated with education, intelligence, and adaptation. Based on these converging findings, we anticipated education to have stronger and more consistent associations with adult Rorschach scores than any other demographic variable, particularly in the domain of Engagement and Cognitive Processing.

Aims of the Current Study

A number of studies have investigated the extent to which gender, ethnicity, age, or education are associated with Rorschach scores. However, more systematic research would be beneficial. The current study examines these variables simultaneously in three samples that encompass patients and nonpatients as well as children, adolescents, and adults.

Method

To investigate the association of gender, ethnicity, age, and education with scores derived from the Rorschach task, we examined archival records from three relatively large, independent samples of adults and youth. We examined the relationship between these demographic variables and 59 interpretively important Rorschach variables found on the R-PAS Profile Pages (Meyer et al., 2011). Because we did not anticipate significant gender and ethnicity effects at any ages and did not expect age effects among our samples of adults, we used stepwise multistage significance testing to determine statistical significance in order to protect against inflated alpha while still retaining power (Howell, 2013). This procedure orders results within a sample by their p value and at the first step applies the Bonferroni correction to the most statistically significant finding. It then sequentially adjusts the critical p value for the number of potentially true null hypotheses remaining in the set of analyses if the previous step was significant. One of the advantages of multistage significance testing is that it preserves statistical power in an exploratory analysis while still protecting against all potentially true null hypotheses in a set of findings (Howell, 2013).

Because the review by Stanfill et al. (2013; see also Giromini, Viglione, Brusadelli, Lang, Reese, & Zennaro, 2014) documented how a number of Rorschach scores in children and adolescents are associated with age, when investigating associations for gender and ethnicity in the youth sample we controlled for the effects of age by testing a series of ANCOVA (see below). Also, given that in young samples education is essentially a function of age, analyses in the youth sample only focused on age, and did not investigate its tightly linked correlate of education level.

Although the DI created by Stanfill et al. (2013) is not a formal part of R-PAS, because it is designed to be correlated with age in youth but uncorrelated with age in adults older than 25

we examined its associations in our samples. For the youth sample, we simply correlated it with age. For our adult samples, we excluded participants less than age 26 before computing correlations.

Participants

The samples included data from: (1) the R-PAS adult normative sample, (2) adult inpatients and outpatients from a hospital-based assessment service, and (3) outpatient children and adolescents from a community mental health agency. Analyses were conducted separately in each sample with the aim to evaluate the consistency of findings across samples.

The Adult Normative Sample. The R-PAS international adult normative sample (Meyer et al., 2011) includes 640 records from 15 independent samples (each of which contributed at most 100 records). Thirteen countries contributed to this data set: Argentina, Belgium, Brazil, Denmark, Finland, France, Greece, Israel, Italy, Portugal, Romania, Spain, and the United States. Although full demographic information is available for each of these samples in their initial publications, this information was not always stored with the protocols that were shared with us, resulting in variable *ns* across analyses (see Table 1). The mean age is 37.3 ($SD = 13.4$; range 17 to 86), the mean years of education is 13.3 ($SD = 3.6$, range 1 to 22), 44.7% are male, and 66.8% of the cases are White. For the age variable, 20.2% of the sample was 25 or younger and 3.8% were 65 or older. Additional details about this sample can be found in Meyer et al. (2011), including a description of the statistical procedures that were used to model R-Optimized administration. For the variables described more fully below that are new to R-PAS and not found in the CS or that are derived from the R-PAS form quality tables, results are based on the 118 English full-text R-PAS normative records.

The Adult Clinical Sample. The adult clinical sample consists of 249 inpatients and

outpatients who took the Rorschach as part of a clinical assessment at a hospital-based service. The 249 protocols were what remained from 432 consecutive evaluations that included the Rorschach after applying R-Optimized modeling procedures and omitting patients younger than 18. These protocols, in either their original or R-Optimized form, have previously been used for other studies (e.g., Meyer, 1997, 1999; Viglione, Giromini, Gustafson, & Meyer, 2014), including an analysis of ethnic differences described earlier (Meyer, 2002), though they have not been examined systematically for gender, age, and education effects. The sample was limited to adults age 18 to 77. The mean age is 34.4 ($SD = 11.6$), the mean years of education is 14.1 ($SD = 2.6$, range 7 to 21), 48.6% are men, 64.3% are White and 28.1% are Black, and 55.4% were never married (26.1% currently married). For the age variable, 26.1% of the sample was 25 or younger and just 0.8% were 65 or older. Of the 185 patients with an externally derived billing diagnosis assigned before testing began, 36.9% had a major depressive disorder, 35.7% a psychotic spectrum disorder, 8.8% a bipolar or cyclothymic disorder, 7.6% an anxiety disorder, and 19.7% were assigned a specific personality disorder in Cluster A, B, or C. The protocols were originally administered and coded using CS guidelines.

The Youth Clinical Sample. The youth clinical sample includes Rorschach protocols from 241 outpatient children and adolescents from a mental health agency in the Midwest. This agency typically serves lower socioeconomic status individuals, and in about 75% of the cases clients are referred with the purpose of obtaining diagnostic clarification. These data have previously been used for other studies (e.g., Reese, Viglione, & Giromini, 2014; Giromini et al., 2014), though not to explore demographic correlates. Because this previous research found no differences in mean scores for the 142 CS administered protocols and the 99 protocols obtained using an R-Optimized administration, we used all 241 protocols to maximize power to detect

gender, ethnicity, and age effects. The mean age is 12.3 ($SD = 3.0$, range 5 to 16), 63.1% were boys, and 77.2% were White with another 13.7% being Black. In this sample the primary diagnoses were as follows: mood disorder = 25.7%, Attention Deficit Hyperactivity Disorder = 18.7%, Post-Traumatic Stress Disorder (PTSD) = 14.9%, anxiety disorder other than PTSD = 11.6%, Oppositional Defiant Disorder or Conduct Disorder = 7.1%, Autism Spectrum Disorder = 4.6%, and psychotic disorder = 0.8%. In addition, 16.6% were court-involved due to sexually inappropriate behavior. These protocols were scored using CS guidelines.

The Rorschach

Variable Selection. In R-PAS, variables important for interpretation are organized into Page 1 and Page 2 Profiles, with Page 1 variables being interpretatively more important and more supported psychometrically. This variable selection and organization was strongly influenced by the meta-analyses conducted by Mihura, Meyer, Dumitrascu, and Bombel (2013) and secondarily by transparency between the response process associated with generating a score and its interpretation, the results of a large scale survey of experienced clinicians (Meyer, Hsiao, Viglione, Mihura, & Abraham, 2013), and parsimony. For this study we considered 59 of the 61 variables that appear on the Page 1 and Page 2 profiles, omitting prompts and pulls, which were either not part of the initial administration or not stored with the electronic records in these three samples. The Adult Normative Sample provides data on all 59 variables; the other two fully CS scored samples provide data on 52 of the variables. The seven variables that are new to R-PAS and not scored in the CS are Card Turns (CT) Oral Dependency Language Percent (ODL%), Space Reversal (SR), Mutuality of Autonomy Pathology Proportion (MAP/MAHP), Aggressive Content (AGC), Mutuality of Autonomy Health (MAH), and Space Integration (SI). The Adult Normative Sample also used the R-PAS form quality tables to score the Ego Impairment Index

(EII-3), Thought and Perception Composite (TP-Comp), Form Quality Minus Percent (FQ-%), Whole and Common Detail Minus Percent (WD-%), Form Quality Ordinary Percent (FQo%), Suicide Concern Composite (SC-Comp), Poor Human Representation Proportion (PHR/GPHR), and Form Quality Unusual Percent (FQu%). In the Adult Clinical and Youth Clinical Samples, these variables were derived from the CS form quality tables. To these R-PAS scored-variables we added the DI, which was calculated using the formulas provided in Stanfill et al. (2013).³

Inter-rater Reliability. Rorschach protocols included in this study were collected by a large number of examiners, with varying levels of expertise. In many instances examiners were expert clinicians holding graduate degrees in psychology, but in some cases less experienced Rorschach users (such as doctoral students) were also used. For each sample, inter-rater reliability information has already been investigated and reported elsewhere, with the results indicating satisfactory reliability. Specifically, inter-rater reliability for the R-PAS Normative Sample was investigated in three primary samples ($Ns = 32, 93,$ and 50), and the mean intraclass correlation coefficients (ICCs) ranged from $.84$ to $.90$, with respectively 86% , 98% , and 90% of the ICCs being excellent, i.e., $\geq .75$ (see Meyer et al., 2007, 2011; Viglione et al., 2014). A fourth reliability study utilized six coders with varying levels of experience from novice to expert who each coded 60 protocols for SR, SI, MAH, MAP, AGC, and ODL. The mean intraclass correlations across all coders ranged from good to excellent ($.69$ to $.87$) and across the three most experienced judges it was excellent for all variables ($.79$ to $.93$; Meyer et al., 2011). Inter-rater reliability for the Adult Clinical Sample was reported by Meyer (1997, 1999). For response segments the percentages of exact agreement ranged from 74% (Determinants) to 97% (Popular), with corresponding good to excellent kappa values ranging from $.63$ (Cognitive Codes) to $.91$

³ Giromini et al. (2014) examine the DI in the Youth Clinical Sample, though their analyses do not make use of the combined sample like we do and do not report the association of age with all the R-PAS variables like we do.

(Location and Space, Popular). Finally, inter-rater reliability for the Youth Clinical Sample was examined by Reese et al. (2014), and the results indicated that most of the variables (i.e., 44) had excellent inter-rater reliability (i.e., ICCs greater than .74), with the remaining variables (7) having good inter-rater reliability (i.e., ICCs between .60 and .74).

Data Screening and Transformations to Correct Skew. Before using parametric statistics we examined variable distributions and applied transformations if skew was greater than 2.0 in absolute value, indicative of at least a moderate departure from normality (Curran, West, & Finch, 1996). A square root transformation was first tested and if skew was not yet reduced below the desired threshold, we applied a log transformation up to an inverse reciprocal to the second power transformation. Ultimately, all variables included in the analyses had an absolute skew value lower than 2.0. Transformed variables were as follows: Severe Cognitive Codes (SevCog), Distorted Human Movement (M-), Vista (V), Pure Color (C), Reflection (r), and Personal Knowledge Justification (PER) in the R-PAS Normative Sample; SevCog, M-, Intellectualized Content (IntCont), C, r, and Aggressive Movement (AGM) in the Adult Clinical Sample; and Weighted Sum of Cognitive Codes (WSumCog), SevCog, M-, IntCont, Vagueness Percent (Vg%), V, C, r, AGM, Texture (T), and Anatomy (An) in the Youth Clinical Sample.

Proportion Scores. In R-PAS there are seven profiled scores that are computed as proportions, contrasting one variable in the numerator and the sum of that variable and its contrasting score in the denominator. To help ensure stability in the proportional values, a score is not computed unless the value in the denominator is three or more. Consequently, some participants do not receive a score on these variables. Because we examine multiple criterion measures with varying sample sizes, rather than reporting the number of participants obtaining each score, in Table 2 we concisely indicate the percent of cases obtaining a score in each sample

across the various criterion variables. Because of this variability in sample sizes, some lower frequency proportions (e.g., particularly MAP/MAHP) may produce non-significant effect sizes that are larger than significant effect sizes computed on all cases.

Analyses. We examined scores in relation to both dichotomous grouping variables and dimensional criteria so all effect sizes were converted to the correlation metric. As noted above, statistical significance was determined by multistage significance testing, which preserves statistical power in an exploratory analysis while still protecting against all potentially true null hypotheses in a set of findings (Howell, 2013). For the Youth Sample, gender and ethnicity were examined using an ANCOVA that held age constant at its mean and effect sizes were derived from the resulting F test. To address correlates with ethnicity we took three steps. In one set of analyses we examined White versus all other ethnicities because this allowed us to maximize the size of the samples being compared while simultaneously forming a contrast between majority versus minority ethnic backgrounds in our two U.S.-based samples. However, the non-White category is heterogeneous and may mask effects for specific ethnic groups. Consequently, in the Normative Sample we also examined all variables using an omnibus ANOVA across the five ethnicities listed in Table 1, with post hoc pairwise mean comparisons evaluated by the Ryan-Einot-Gabriel-Welsch Range Test (Howell, 2013). Finally, in the two clinical samples the *N*s were large enough to test for differences specifically between Whites and Blacks.

Results

Table 3 provides effect sizes for the 52 variables examined in all three samples. For gender, effect sizes are positive when scores are higher in females than in males and negative when the reverse is true. Table 3 reveals there were no significant associations for gender. For the seven additional variables that were coded in the Adult Normative Sample, correlations were

also nonsignificant across all variables: CT, $r = .07$; ODL%, $r = -.02$; SR, $r = -.11$; MAP/MAHP, $r = -.12$; AGC, $r = -.07$; MAH, $r = -.20$; and SI, $r = -.03$.

For ethnicity, effect sizes are positive when scores are higher in non-Whites than in Whites and negative when the reverse is true. Table 3 shows two statistically significant findings out of 260 effects reported, with Personal Knowledge Justification (PER) being higher in Whites than Other Ethnicities and Anatomy (An) being higher in Other Ethnicities than Whites in the Adult Normative Sample.⁴ An omnibus ANOVA was also calculated for all variables across the five ethnic classifications in the Adult Normative Sample. Only one variable met criteria for significance, with Whites having a significantly higher mean on PER than the mean found in each of the other groups. Finally, in the Adult Normative Sample there were no significant associations for the White versus Other Ethnicities contrast across CT ($r = -.10$), ODL% ($r = -.03$), SR ($r = -.04$), MAP/MAHP ($r = -.22$), AGC ($r = .01$), MAH ($r = -.03$), and SI ($r = .07$).

Considering age in adults, there were no significant associations in the Adult Clinical Sample. In the Adult Normative Sample, Table 3 shows three significant associations, with the Vigilance Composite (V-Comp) decreasing with age and both Texture (T) and PER increasing with age. In the Adult Normative Sample there were no significant associations for CT ($r = .00$), ODL% ($r = .07$), SR ($r = .10$), MAP/MAHP ($r = -.25$), AGC ($r = -.10$), MAH ($r = .02$), and SI ($r = -.12$). In the Youth Clinical sample a number of variables significantly correlated with age. In particular, seven out of eight Page 1 variables in the Perception and Thinking Problems domain yielded statistically significant results indicating that as children age and mature, their perceptions becomes less distorted and more conventional and their thought processes more logical and coherent.

⁴ Note that in this sample TP-Comp, FQ-%, WD-%, and FQo% had larger effect sizes than PER and An but they were based on the subsample of full-text protocols ($n = 118$) and thus had larger p values than PER and An.

Supplemental analyses of the DI indicated it performed as expected. In the Normative Sample of adults over age 25, the correlations are .001 when using the CS FQ tables ($N = 489$) and .016 when using the R-PAS FQ tables ($N = 101$), both of which are nonsignificant. In the Adult Clinical sample, the DI correlation with age is $r = .11$ ($N = 184$), which again is nonsignificant. However, the DI had a significant association with age in the Youth Clinical Sample ($r = .30$, $p = .000002$, evaluated relative to an adjusted critical $p = .001$). All the DI variables are included on the R-PAS Profile Pages except for Art and Sx. In the Youth Clinical Sample these two variables were not correlated with age (both $r_s = .05$).

With respect to Education among adults, Table 3 indicates that there are a number of significant findings. In the Adult Normative Sample, Complexity, the Sum of Human Movement and Weighted Color (MC), Human Movement (M), Sum of Shading Variables (YTVC'), Percent of Whole responses (W%), Weighted Sum of Color (WSumC), Sum of Human Content (SumH), and V-Comp all increase with increasing years of education, while the Percent of Pure Form (F%) and Percent of Unusual Detail responses (Dd%) decrease with increasing years of education. In the Adult Clinical Sample, Complexity, Synthesis (Sy), and MC have a positive association with education, while F% has a negative association. In the Adult Normative Sample there were no significant associations for CT ($r = .03$), ODL% ($r = -.05$), SR ($r = -.01$), MAP/MAHP ($r = .11$), AGC ($r = .06$), MAH ($r = -.17$), or SI ($r = -.02$).

Supplemental Adult Age Analyses

As reviewed in the Introduction, in younger ages cognitive abilities tend to increase with age, while in older ages an opposite trend of decline occurs. Accordingly, one may expect the relationship between adult age and performance on the Rorschach task to be nonlinear. To investigate this we supplemented the linear analyses by testing quadratic and cubic associations

in the two Adult samples. Only V-Comp showed a significant curvilinear association with age in the Adult Normative Sample; r was $-.17$ for both the quadratic and cubic functions, which is virtually identical to the $r = -.16$ obtained for the linear function. As with the linear function, nonlinear associations for V-Comp did not replicate in the Adult Clinical Sample, which produced nonsignificant and near zero effects ($r = -.02$ for the quadratic function, $r = -.03$ for the cubic function). No other variables were significantly associated with curvilinear functions of age in either of the two samples.

Discussion

The main aim of this study was to investigate the extent to which gender, ethnicity, age, and education were associated with scores derived from the Rorschach. We examined three relatively large samples, including both clinical and nonclinical data and adults and youths. Consistent with previous research, youth age and adult level of education were significantly associated with a number of Rorschach variables, while gender, ethnicity, and adult age had no reliable or consistent associations across these samples.

After averaging the 52 effects in Table 3 that were examined across all three samples, the average effect for gender across all variables was $r = .015$ and the maximum value was $|r| = .11$. The fact that no notable gender differences emerged is consistent with our hypotheses, as well as with most previous Rorschach findings. Using Exner's words (Exner, 1991), one may conclude that gender differences on the Rorschach "are inconsequential" (p. 38). The lack of gender differences is consistent with previous research on cognitive functioning, which indicates that men and women produce very similar IQ scores (Nisbett et al., 2012). However, men and women do differ on a number of personality traits when self-report instruments are utilized. Using the Revised NEO Personality Inventory (Costa & McCrae, 1992), for example, Costa et al. (2001)

reported that women tend to be slightly higher in Neuroticism, Agreeableness, Warmth, and Openness to Feelings, whereas men tend to be slightly higher in Assertiveness and Openness to Ideas. In addition, on the deliberately gendered MMPI-2 scales substantial gender differences are evident (Greene, 2011). Given the contrast between self-reported and Rorschach-assessed personality characteristics, it is possible that men and women think of themselves differently, as manifest in their self-descriptions, even though they do not differ in their observed behavioral performance on the Rorschach task (see e.g., Bornstein, 1995). Alternatively, it is possible that the constructs assessed by self-description measures can capture gendered differences better than the pool of Rorschach-based scores considered in these analyses, none of which were deliberately designed to assess differences in gendered experience. Although future research will be beneficial to understand what contributes to gender differences in self-reported characteristics, it is clear from this study is that men and women, as well as boys and girls evaluated in a clinical context, produce very similar R-PAS records when administered the Rorschach task.

Ethnicity, which was operationally defined as five ethnic categories in our Adult Normative Sample, as White versus Black in our two clinical samples, or as White versus Other Ethnicities in all three data sets, also demonstrated no replicable associations with the Rorschach scores. Only two statistically significant associations were found, and neither was observed in more than one sample. After averaging effects across samples, the average effect for the White versus Other comparison across all variables was $r = -.017$ and the maximum absolute value was $|r| = .11$; for the White versus Black comparison, the average effect was $r = -.033$ and the maximum was $|r| = .14$. Taken together, these racial and ethnically based findings support and extend Meyer et al.'s (2007) conclusion that respondents with different country-based cultural backgrounds look quite similar to each other on conventional Rorschach scores. This conclusion

is also consistent with literature reviews on the MMPI, MMPI-2, and MMPI-A indicating that within the U.S. ethnic background is minimally associated with the personality characteristics assessed by these measures (Greene, 2011).

When interpreting our ethnicity results, it should be noted that the Adult Normative Sample is comprised of sub-samples from 13 countries. Across countries the ethnicity labels do not consistently refer to people from majority and minority groups. For example, in Argentina, White would designate a minority group and Hispanic the majority, and the impact of ethnic distinctions in terms of customs, power, and opportunity can vary across countries and regions. Thus, the generalizability of the findings from the Adult Normative sample may be somewhat limited. On the other hand, for almost all of the variables investigated, the Adult Normative Sample produced results that were very similar to those produced by the other two U.S.-based samples. In line with our hypotheses and previous research (e.g., Meyer, 2002; Meyer et al., 2007), one may reasonably conclude that R-PAS scores are minimally affected by the cultural background or ethnic origin of the respondent, even though response verbalizations may involve clinically relevant cultural references (Gowri, 2000; Rafiee, 2014).

Similar to gender and ethnicity, within the two non-elderly adult samples under investigation here, age had no reliable association with the Rorschach scores considered, including the DI. Only three significant associations (i.e., with V-Comp, T, and PER) emerged within the Adult Normative Sample and each had a relatively small effect size ($|r| \leq .16$) that did not replicate in the Adult Clinical Sample. After averaging effects across samples, the average effect for adult age across all variables was $r = .007$ and the maximum absolute value was $|r| = .15$. A series of quadratic and cubic functions were also used to test potential nonlinear relationships and the results of these additional analyses provided no incremental gain. Such a

conclusion is consistent with our hypotheses, as well as with much of the previous research on Rorschach scores with adults. At the same time, however, we believe additional research is needed to examine potential declines in complexity-related variables with advancing age. Our samples had a very limited number of elderly participants, which reduces the probability of detecting potential aging effects. If elderly is defined as age 65 or older, only 3.8% of the Adult Normative Sample met this criterion and only 2 people (0.8%) met this criterion in the Adult Clinical Sample. At the same time, these two samples had a substantial proportion of young adults so power was less of a consideration at this end of the adult age spectrum. Thus, if there are genuine differences between young adults and adults, the differences are likely to be small.

Differently from the adult samples, but in line with some of our expectations and previous literature (e.g., Stanfill et al., 2013), several statistically significant correlations with age emerged when considering the Youth Clinical Sample. From Table 3 it is clear that as children and adolescents age and mature, their perceptions become less distorted and more conventional, while their thought processes become more organized and logical, with lower values on the EII-3, TP-Comp, WSumCog, SevCog, FQ-%, and WD-%. In addition, there is a greater preponderance of Human Movement relative to the Weighted Sum of Color (M/MC), more articulation of Diffuse Shading (Y), and a decrease in the Weighted Sum of Color (WSumC). Thus, similar to other instruments used in cognitive assessment (e.g., Wechsler, 2003), specific Rorschach scores also are sensitive to developmental changes and maturation in youth.

Although the findings noted above for the Thought and Perception variables as well as Y were expected based on previous research (Stanfill et al., 2013), we also anticipated significant associations for other determinant based scores and selected contents, particularly those that are

included in the DI equation (i.e., F%, m, FD, r, T, V, An, Art, and Sx). In the Youth Clinical Sample, V was positively correlated with age using a conventional level of significance ($p = .003$), though not when evaluated against the adjusted critical p value (.00125) imposed by our multistage significance testing procedure. The remaining DI variables were not significant at a conventional level, though r and An approached significance ($ps = .079$ and $.085$, respectively) with small effect sizes (both $r = .11$).

It is unclear what factors may explain the clear lack of expected associations for F%, m, FD, T, An, Art, and Sx, along with the general Complexity variable in this sample. One possibility is that psychopathology played a larger role influencing scores than developmental age. This is consistent both with the fact that Stanfill et al. (2013) used non-patient samples to develop the DI and with their expectation that the association between age and the DI would be diminished in clinical samples. To explore the possible confounding effect of pathology, we correlated the EII-3 as a marker of psychopathology with various markers of protocol complexity, finding strong associations for a number of variables including Complexity (.40), F% (-.30), Determinant Blend Responses (Blend; .31), Sy (.36), and MC (.47) and its subcomponent scores ($M = .35$, $WSumC = .38$). Thus, in this sample general psychopathology is strongly associated with determinant-based and synthetic complexity markers, which means psychopathology may potentially override the expected developmental trends for these variables. Overall, the findings suggest it will be important for future research examining the DI to also evaluate its subcomponents. More generally, when working with youth clinical samples it will be important to consider the potential obscuring influence of psychopathology on developmental processes, or conversely how disruptions in normal developmental processes are primary contributors to psychopathology.

When considering the adult samples, the only demographic variable that produced several significant correlations with R-PAS variables is education. In line with our expectations, as well as with a number of past studies (e.g., Nascimento, 2004; Pires, 2007), increased education among adults was positively associated with complexity and determinant articulation (e.g., Complexity, YTVC'), increased cognitive synthesis (e.g., Sy, W%), and more coping resources (e.g., MC, M, WSumC). When considering the average effect size across both adult samples, the variables with coefficients of $|r| = .15$ or greater were MC (.23), Complexity (.22), F% (-.22), Dd% (-.20), Blend (.17), Sy (.17), M (.17), IntCont (.17), WSumC (.17), V-Comp (.17), YTVC' (.16), W% (.16), and SumH (.15). These associations are in the small to medium range and in general they are not surprising given that the degree of differentiation, integration, and synthetic productivity shown in Rorschach behavior should be associated with education, intelligence, and adaptation (Meyer et al., 2011). Consistent with their classification in R-PAS, almost all of these variables are found in the Engagement and Cognitive Processing section of the interpretive Profile pages. The variables not in that section are V-Comp, YTVC', and SumH. However, their significant but modest association with level of education is consistent with their interpretation in the R-PAS manual as indicative of mental sophistication and cognitive capacity. More generally, although the effects we observed are smaller, our findings are consistent with the literature on cognitive functioning indicating that increasing education is associated with better performance on complex problem solving tasks (e.g., Walker et al., 2009), of which the Rorschach is one.

To some extent our Rorschach findings converge with self-report findings of greater adaptive resources with increasing education (Greene, 2011), though they diverge with respect to decreasing general disturbance or symptomatology (Greene, 2011; Morey, 2007), as those effects were not evident in our data. If one considered YTVC' to be a marker of affective distress rather

than cognitive sophistication in the articulation of perceptual determinants, which we are not, the data would actually suggest Rorschach and self-report findings that are in opposition to each other. Given the different patterns observed with these two methods of assessment, it would be valuable for further research to evaluate whether lower levels of education are jointly linked to Rorschach-based measures of simplicity and limited coping resources as well as to self-reported affective, interpersonal, and functional difficulties.

It was surprising that SI was not associated with age ($r = -.02$). In previous research using a nonpatient sample from Romania (Dumitrascu, 2007), SI had a very strong correlation with level of education ($r = .48$, $N = 111$; Dumitrascu, Mihura, Meyer, & Onofrei, 2011). That sample had considerable variability in level of education, with a range of 4 to 22 years and a $SD = 3.13$ years. For the full-text subset of the Adult Normative sample, education had a range of 11 to 21 years and a $SD = 2.15$ years. So a restriction in range may contribute to these differences, though it would not account for such notable divergences. Charek, Meyer, and Mihura (2014) recently documented that SI was one of the variables most sensitive to the impact of an experimentally induced mental state of ego depletion, consistent with the view that cognitive effort and sophistication are required to generate this score. Given the conflicting findings, we recommend more focused research on the extent to which SI is related to cognitive functioning variables, including years of education, general intelligence, or the transient impact of cognitively draining activities.

This investigation used three relatively large samples that included clinical and nonclinical participants, as well as youth and adult subjects. Multiple examiners with varying levels of expertise using the Rorschach contributed to these data. Many of the examiners and many respondents in the Adult Normative Sample were from non-U.S. Countries. Most of the

results were in the expected direction and confirmed conclusions that were previously reported in the literature. Given the size and breadth of the samples and range of examiners contributing data we consider the findings for gender, adult age, and adult education to be reliable, replicable, and generalizable and the findings for ethnicity and youth age to be more tentative. The absence of gender, ethnicity, and age effects support a unified set of adult norms to guide clinical practice about what is typical or expected on the Rorschach task.

At the same time, clinicians should appreciate that education is associated with most of the R-PAS Engagement and Cognitive Processing variables that are not difference scores or proportion scores. The small to medium sized effects observed for these Rorschach variables are much smaller than the educational effects observed with tests of maximal performance, such as IQ and neuropsychological measures of cognitive ability. Nonetheless, it still might be clinically useful if one was able to generate education adjusted normative scores for relevant Rorschach variables.

Clinicians should also be mindful that youth age has a noteworthy impact on variables related to thought disorder and distorted perceptions. The latter is particularly important because CS norms have been atypical in not showing developmental trends for FQ-%, WD-%, or FQo% (Exner, 2003; Wenar & Curtis, 1991), even though that is a standard finding in other normative data sets (e.g., Ames et al., 1971, 1974; Meyer, Viglione, & Giromini, 2014b; Stanfill et al., 2013).

Although this study has some notable strengths, a number of limitations are also important to mention. First, records from the two adult samples were statistically modeled to approximate the R-Optimized administration procedures found in R-PAS. Although research has consistently shown that the modeling procedure is accurate and does not greatly impact the

results (e.g., see Meyer et al., 2011; Reese et al., 2014; Viglione, Giromini, Gustafson, & Meyer, 2014; Viglione, Perry, Giromini, & Meyer, 2011), it would be valuable to have additional studies beyond the Youth Clinical Sample that are conducted with actual R-PAS administration. Second, the seven variables that are new to R-PAS and not found in the CS (CT, SR, SI, AGC, MAH, MAP/MAHP, and ODL%) were only examined in the Adult Normative Sample using a subset comprised of 118 U.S. records. Additional studies with large sample sizes are needed to replicate our findings and better investigate the relationship between these variables and gender, ethnicity, age, and education. The same subset of 118 records in the Adult Normative Sample also was coded using the R-PAS Form Quality tables. However, the eight scores that depend on Form Quality (EII-3, TP-Comp, FQ-%, WD-%, FQo%, SC-Comp, PHR/GPHR, and FQu%) did not show any differential pattern of relationships with demographic variables when using the R-PAS Form Quality tables versus the CS Form Quality tables that were used in the other two samples. Third, our samples were designed a priori to study demographic influences. Accordingly, effect sizes might be mitigated by uncontrolled methodological influences, such as levels of psychopathology obscuring stronger age or education effects. Studies explicitly designed to study demographic variables with methodological control of extraneous variables and possible confounds might provide more precise measurement of effect sizes and probability levels.

Fourth, the analyses related to ethnicity were limited. . Although five ethnic classification categories were examined in the Adult Normative Sample most of the non-White categories had relatively few participants and were thus underpowered to detect differences. Because of this, we also examined contrasts of White versus Black in both of the clinical samples and White versus Other Ethnicity in all three, with the latter forming a contrast between majority and minority ethnic groups in the two U.S.-based samples. We recognize these analyses are either

underpowered, incomplete, or imprecise because of heterogeneity. Thus, it would be valuable for future studies to explore additional ethnic differentiations using large samples and statistical controls to guard against Type I error, both within the U.S. and in other countries. Ethnic research across and within countries can also explore cultural influences in response verbalizations (Gowri, 2000; Rafiee, 2013) and try to determine under what conditions they might influence scored variables.

Fifth, our results address only central tendency differences associated with demographic variables; they do not evaluate differential validity or tests of fairness and bias across gender, ethnicity, age, and education. Sixth, although the similar pattern of effects observed in the adult samples for gender, ethnicity, adult age, and education did not suggest any potential interaction of clinical status with demographics, we did not attempt to examine interactive contrasts using the Adult Normative and Clinical Samples. Seventh, in order to evaluate replicability across samples, we did not attempt to combine the datasets or compute mean difference scores across them (e.g., contrasting Youth means with Adult means). Finally, most protocols were obtained using CS administration and most variables were scored using CS guidelines. It is possible that finer-grained demographic associations may be evident using the more structured and detailed administration and coding guidelines found in R-PAS.

Despite these limitations, by encompassing a large number of patients and nonpatients as well as adults and children, this study confirms and extends previous findings. It also provides important information on the lack of relationship between Rorschach scores and gender, ethnicity, and non-elderly adult age, as well as small to moderate associations between education and a range of variables reflecting cognitive, emotional, or representational sophistication and medium inverse associations between youth age and liabilities in thinking and perception.

For both clinical practice and research, the results also help illustrate the methodological distinctiveness of Rorschach data relative to maximal performance tests of cognitive ability and self-report tests of personality. Like self-report tests but unlike cognitive ability tests, these data are consistent with the conclusion that ethnic differences in Rorschach scores, if they exist at all, are likely to be very small. Like cognitive ability tests but unlike self-report tests, the Rorschach scores considered here reveal no gender effects. Like both cognitive ability tests and self-report tests, some of the scores show clear patterns of association with age among youth and with education among adults.

In applied multimethod assessment practice, being mindful of these similarities and differences will help clinicians appropriately contextualize clients based on their background demographic characteristics. For assessment science, awareness of these methodological similarities and differences facilitates an enhanced understanding of the tools available for measuring personality and cognition, with recognition that the Rorschach task falls in a zone between the other two methods, providing a range of scores that span the continuum from what can be considered personality trait and state variables to what can be considered cognitive and information processing variables. With its international foundation, minimal effects from demographic variables, broad coverage of psychological dimensions, applicability to all but the youngest children, incremental validity relative to self-report methods (Meyer et al., 2011; Mihura et al., 2013; Viglione & Hilsenroth, 2001), the Rorschach continues to meet many clinical assessment needs across cultures.

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Table 1. Composition and Size of the Samples for the Various Analyses

	Adult Normative Sample	Adult Clinical Sample	Youth Clinical Sample
	Nonpatient Adults (N = 640)	Inpatient & Outpatient Adults (N = 249)	Child & Adolescent Outpatients (N = 241)
Administration	CS (R-Optimized Modeled)	CS (R-Optimized Modeled)	CS and R-Optimized
Gender			
M	n = 273, 44.7%	n = 121, 48.6%	n = 152, 63.1%
F	n = 338, 55.3%	n = 128, 51.4%	n = 89, 36.9%
Ethnicity			
White	n = 261, 66.8%	n = 160, 64.3%	n = 186, 77.2%
Black	n = 10, 2.6%	n = 70, 28.1%	n = 33, 13.7%
Hispanic	n = 34, 8.7%	n = 6, 2.4%	n = 2, 0.8%
Asian	n = 10, 2.6%	n = 11, 4.4%	n = 1, 0.4%
Other or Mixed	n = 76, 19.4%	n = 2, 0.8%	n = 19, 7.9%
Age			
Mean	37.3 (n = 613)	34.4 (n = 249)	12.3 (n = 241)
SD	13.4	11.6	3.0
Education Years			
Mean	13.3 (n = 346)	14.1 (n = 248)	6.8 (n = 241)
SD	3.6	2.6	2.9

Table 2. The Relative Frequency of Proportion Scores Calculated in Each Sample across the Demographic Criterion Variables

Proportion Score	Adult Norms	Adult Clinical	Youth Clinical
Human Movement (M/MC)	93-94%	80-81%	80-81%
Color Dominance [(CF+C)/SumC]	71-75%	66-67%	60-61%
Mutuality of Autonomy Pathology (MAP/MAHP)	25-27%		
Poor Human Representation (PHR/GPHR)	95-98%	93-94%	89%
Passive Human Movement [Mp/(Ma+Mp)]	63-64%	77-78%	40-41%
Non-Pure-Human (NPH/SumH)	90-91%	91-92%	86%
Passive Movement [p/(a+p)]	93-94%	96%	80%

Note. Proportion scores are only calculated when the denominator score has a value of three or more. This table indicates what percent of the cases had a proportion score across the gender, ethnicity, age, and education variables. For instance, the Human Movement Proportion was available for 93% or 94% of the cases in the Adult Normative Sample depending on the criterion; it was available for 80% or 81% of the cases in the two clinical samples depending on the criterion.

Table 3. Effect Sizes (*r*) Summarizing the Association between 52 of the Rorschach Scores and Gender, Ethnicity, Age, and Adult Years of Education in Three Samples

Profile Page / Domain/ Variable	Gender ^a			Ethnicity ^b					Age		Adult Education		
	Adult	Adult	Youth	Adult	Adult	Adult	Youth	Youth	Adult	Adult	Youth	Adult	Adult
	Norms	Clinical	Clinical	Norms	Clinical	Clinical	Clinical	Clinical	Norms	Clinical	Clinical	Norms	Clinical
	(n = 611)	(N = 249)	(N = 241)	W vs. O (n = 391)	W vs. O (N = 249)	W vs. B (n = 230)	W vs. O (N = 241)	W vs. B (n = 219)	(n = 613)	(N = 249)	(N = 241)	(n = 346)	(n = 248)
Page 1													
Engagement and Cognitive Processing													
Complexity	.01	-.03	.07	-.08	-.14	-.18	.03	.04	-.04	.10	.06	.21	.23
R	.02	-.09	.05	.02	-.09	-.11	-.03	.02	-.05	-.01	.08	.05	.09
F%	-.04	-.10	-.01	.05	.11	.13	-.05	.07	-.05	-.11	-.01	-.23	-.21
Blend	.01	.01	.03	-.13	-.17	-.21	.03	.01	.02	.11	-.01	.17	.16
Sy	-.01	.02	.08	-.16	-.06	-.08	.06	.08	-.02	.05	.04	.13	.22
MC	.02	.07	.11	-.10	-.12	-.15	.01	-.03	-.04	.10	-.05	.23	.22
MC – PPD	-.03	.05	.06	.00	.08	.09	-.03	.00	-.12	.00	-.10	.06	.04
M	-.04	.03	.13	-.08	-.06	-.07	.01	.00	-.04	.08	.12	.18	.17
M/MC ^c	-.05	-.09	.05	-.02	.05	.05	.02	.03	.02	.00	.24	-.04	.00
(CF+C)/SumC ^c	-.01	.02	.09	-.15	-.16	-.08	.04	-.04	.07	.17	-.06	-.03	.05
Perception and Thinking Problems													
EII-3 ^d	-.05	.08	.11	.11	.06	.03	-.08	-.13	.05	.02	-.32	.01	.10
TP-Comp ^d	-.12	.04	.10	.24	.08	.07	-.06	-.11	-.01	-.06	-.35	-.01	.04
WSumCog	-.01	.10	.11	.11	.08	.06	-.05	-.07	-.03	.11	-.37	.07	.08
SevCog	-.01	.13	.06	.11	.15	.12	.00	-.02	-.08	.02	-.28	-.01	.06
FQ-% ^d	-.09	-.03	.07	.25	.06	.07	-.09	-.13	-.03	-.11	-.27	-.06	-.04
WD-% ^d	-.15	.03	.04	.27	.10	.11	-.02	-.05	-.06	-.12	-.28	.03	-.03
FQo% ^d	.01	-.01	.01	-.19	-.01	-.02	.04	.10	.06	.10	.26	-.03	.01
P	.03	.14	.09	-.03	.00	-.02	.04	.07	.08	.03	.15	.14	.10
Stress and Distress													

Profile Page / Domain/ Variable	Gender ^a			Ethnicity ^b					Age			Adult Education	
	Adult Norms (n = 611)	Adult Clinical (N = 249)	Youth Clinical (N = 241)	Adult Norms W vs. O (n = 391)	Adult Clinical W vs. O (N = 249)	Adult Clinical W vs. B (n = 230)	Youth Clinical W vs. O (N = 241)	Youth Clinical W vs. B (n = 219)	Adult Norms (n = 613)	Adult Clinical (N = 249)	Youth Clinical (N = 241)	Adult Norms (n = 346)	Adult Clinical (n = 248)
YTVC'	.02	.00	.06	.01	-.17	-.20	.04	-.01	.03	.08	.07	.18	.14
m	.04	-.01	-.08	-.06	-.11	-.15	.04	.06	.09	.01	.06	.04	.13
Y	.03	.06	.15	.00	-.09	-.08	-.01	-.02	-.01	.02	.31	.13	.11
MOR	.01	.07	.08	-.05	-.05	-.08	.06	.08	.01	.02	-.02	-.03	.15
SC-Comp ^d	-.04	-.07	-.06	-.06	-.14	-.14	.01	-.03	-.11	.01	-.05	.04	.11
<i>Self and Other Representation</i>													
PHR/GPHR ^{c,d}	-.15	.04	.02	-.02	.08	.05	-.09	-.13	.07	-.05	-.27	-.01	.01
M ^{-d}	-.04	-.01	.12	.07	-.09	-.11	-.06	-.09	-.01	-.02	.02	-.08	.14
H	-.02	.07	.14	.02	.00	.04	.13	.21	-.06	.06	.10	.11	.08
COP	-.02	.09	.08	-.05	-.01	.00	.01	.02	.00	.20	.05	.09	.10
Page 2													
<i>Engagement and Cognitive Processing</i>													
W%	-.02	.08	-.06	-.06	.00	-.03	.03	.03	-.01	-.02	.02	.20	.11
Dd%	-.07	-.04	.03	.01	-.09	-.08	.05	.03	-.11	-.03	-.08	-.25	-.15
IntCont	-.04	.05	.05	.00	-.14	-.16	.04	.11	.02	.19	.10	.14	.20
Vg%	.06	.11	.05	-.08	-.09	-.08	.12	.08	.06	.09	-.08	-.01	.07
V	-.08	-.12	.02	-.08	-.15	-.16	.07	-.04	-.05	-.03	.19	.11	.02
FD	-.06	-.12	-.01	-.11	-.10	-.12	.01	.01	-.09	-.02	.08	.11	.17
R8910%	.07	-.06	.16	.02	-.01	.03	-.15	-.21	-.06	.03	.01	-.08	-.08
WSumC	.07	.09	.03	-.07	-.13	-.16	.00	-.05	-.03	.06	-.22	.19	.15
C	.05	.03	.08	-.05	-.07	-.12	-.02	-.06	.00	-.02	-.17	.03	.10
Mp/(Ma+Mp) ^c	.03	.08	.03	-.16	.04	.02	.01	-.05	-.01	-.12	-.05	-.02	-.01
Perception and Thinking Problems													
FQu% ^d	.04	-.02	-.09	.11	-.03	-.02	.02	.00	-.11	-.01	.04	.06	.01
Stress and Distress													

Profile Page / Domain/ Variable	Gender ^a			Ethnicity ^b					Age		Adult Education		
	Adult Norms (n = 611)	Adult Clinical (N = 249)	Youth Clinical (N = 241)	Adult Norms W vs. O (n = 391)	Adult Clinical W vs. O (N = 249)	Adult Clinical W vs. B (n = 230)	Youth Clinical W vs. O (N = 241)	Youth Clinical W vs. B (n = 219)	Adult Norms (n = 613)	Adult Clinical (N = 249)	Youth Clinical (N = 241)	Adult Norms (n = 346)	Adult Clinical (n = 248)
PPD	.04	.01	.01	-.07	-.16	-.19	.03	-.02	.08	.07	.06	.12	.12
CBlend	.02	.04	-.02	-.15	-.08	-.07	.13	.12	-.03	.04	-.05	.13	.08
C'	.02	-.01	-.07	.07	-.15	-.20	.07	.02	.03	.07	-.19	.16	.12
V (S&D) ^e	-.08	-.12	.02	-.08	-.15	-.16	.07	-.04	-.05	-.03	.19	.11	.02
CritCont%	.02	.07	.00	.03	-.05	-.07	.04	.03	.04	.04	.01	.10	.10
<i>Self and Other Representation</i>													
SumH	-.07	-.06	.13	.08	-.05	-.06	.02	.05	-.12	.10	.07	.20	.10
NPH/SumH	-.04	-.11	-.12	.00	-.01	-.06	-.16	-.22	-.02	.02	-.10	.04	-.01
V-Comp	-.08	-.18	.07	.03	-.07	-.12	-.04	-.04	-.16	.00	.10	.21	.12
r	-.05	-.07	-.01	-.06	-.12	-.10	.06	.02	-.12	.00	.11	.08	.13
p/(a+p) ^c	.04	.10	.18	.00	-.01	-.01	-.03	-.13	-.07	-.07	.06	.06	.03
AGM	.00	.06	.01	-.14	.01	.00	-.04	-.01	.05	.03	.00	.05	.05
T	.06	.04	.15	-.04	-.09	-.10	.00	-.03	.14	.15	-.08	-.01	.10
PER	.04	-.05	-.02	-.23	-.08	-.08	.09	.03	.14	.11	.03	-.03	.01
An	.11	.06	.05	.18	.00	-.04	.03	-.04	.00	.09	.11	.09	.07

Notes. W = White, B = Black, O = Other Ethnicity. Bolded coefficients are statistically significant following multistage significance testing.

^a Effect sizes are positive when scores are higher in females than males and negative when the reverse is true.

^b Effect sizes are positive when scores are higher in non-Whites than Whites and negative when the reverse is true.

^c Proportion scores are only computed when there are at least three scores in the denominator. See Table 2 for details about sample size.

^d In the Adult Normative Sample these scores were derived from the subset of full-text protocols (n = 118).

^e This variable appears in both the Engagement and Cognitive Processing section and the Stress and Distress section.